

Foreword

The attached Standard Operating Procedure is the internal policy of the Land Quality Division of the Wyoming Department of Environmental Quality covering the topic of Postmining Topography Assessments. Staff shall make no significant deviations from this policy without the prior approval of the District Supervisor and the Administrator.

Signed this _____ day of _____, 1997

Richard A. Chancellor
Administrator
Land Quality Division

COAL STANDARD OPERATING PROCEDURE NO. 3.1

Land Quality Division

SUBJECT: Postmining Topography Assessments

I. Introduction

A. General Information

1. This document is intended to assist staff and coal operators in meeting requirements of the DEQ/LQD Coal Rules and Regulations (Coal R&R) concerning the assessment of postmine topography. This SOP contains recommendations for assessing the classification of a coal mine's postmine topography (PMT) into one of three categories: Thin overburden; Approximate Original Contour (AOC); or Thick overburden mine.

2. Coal R&R Chapter 4, Section 2(b)(iii) states "all affected lands shall be returned to their approximate original contour, except as authorized by a variance or exemption under Chapter 5, Sections 6 and 7, or Chapter 8, or Chapter 9." Chapter 5 allows areas of coal to remain exposed, with Administrator approval, to allow future access for auger mining or underground mining. Chapter 8 allows for variation if the coal mine is classified as a Special Bituminous Coal Mine. Reviewers should refer to Chapter 8 when reviewing postmine topography submittals concerning Special Bituminous Mines. Chapter 9 outlines the process for requesting a variance from the Coal R&R.

B. Definitions

1. *Approximate Original Contour*: The reclaimed land surface configuration achieved by backfilling and grading of the mined areas, closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain (Coal R&R Chapter 1, Section 2(h)).
2. *Thin Overburden*: The volume of all available spoil and suitable waste materials over the life of mine is demonstrated to be insufficient to achieve AOC considering bulking factor and coal removal. Surface activities shall be conducted to use all available spoil and suitable waste materials to attain lowest practical grade, but not more than the angle of repose (Coal R&R Chapter 4, Section 2(b)(vi)).
3. *Thick Overburden*: The volume of spoil over the life of mine is demonstrated to be more than sufficient to achieve AOC considering bulking factor, coal removal and subsidence of backfilled material. Excess spoil may be placed outside the pit area (Coal R&R Chapter 4, Section 2(b)(vii)).
4. *Excess Spoil*: Spoil material disposed in a location other than the "mined out" area, except that spoil material used to achieve the AOC or to blend the mined out area with surrounding terrain (Coal R&R Chapter 1, Section 2(ag)).
5. *Out-of-Pit Spoil*: Spoil material which has been placed outside the area affected through overburden removal.
6. *Blend*: To combine or associate so that the separate constituents or line of demarcation cannot be distinguished.

II. General Reclamation Plan & PMT Considerations

- A. All permittees must provide an overburden classification declaration (Thin, AOC or Thick). Overburden classification can be done on a pit by pit basis provided there is native topography separating pits. The Mine or Reclamation Plan should contain a distinct section which collates, evaluates and summarizes the data to make a clear statement of the overburden designation. This section should clearly reference data from other Sections or Appendices of the permit. Supporting information should include the material balance, slope analysis, elevation and general landform. Evidence supporting the declaration can be located in other sections of the permit and referenced in the declaration. When considering the material balance, the permittee must give careful consideration to the derivation of a documented, verifiable swell factor for use in calculating the replacement volume ratio.
- B. Once the permittee has determined their overburden classification, the postmine topography should be developed based on the declaration. The overburden declaration has a direct bearing on the degree of postmine features (e.g., ridgelines) that can be constructed. Generally, plans for construction and illustration (PMT Map and cross sections) of the postmine land surface should indicate that all spoil generated by the mining operation has been returned (transported, backfilled and compacted) to the mine pit and graded to eliminate all highwalls and depressions. Terraces or benches can be incorporated into the design of the PMT only when it can be demonstrated that other erosion prevention and slope stabilization techniques will not accomplish the same result.
- C. PMT development should consider the average of the premine measured slopes. The distribution of the postmine hillslope gradients should approximate the premine distribution. Postmine slope gradients should be designed to allow for a minimum long-term static safety factor of 1.3 in order to restore stable drainages and hillslopes. All backfilling, grading and contouring should be executed in such a manner so as to preserve the native drainage pattern.

III. Determination of Overburden Classification

- A. The manner in which the Coal R&R are written assumes all mines can and will meet AOC. Permittees must demonstrate why they can or cannot meet the AOC overburden classification. Historically, the use of the volume replacement ratio (spoil volume + bulking)/(coal volume + overburden volume) was used to differentiate between Thin, AOC and Thick overburden classifications. AOC was classified as a volume replacement ratio between 0.8 and 1.2; Thin was a ratio less than 0.8 and Thick a ratio greater than 1.2. These ratios have since been removed from the Federal Regulations by Court action and

do not exist in the Coal R&R. However, the LQD uses these ratios as a first approximation or "rule-of-thumb" for determining overburden classification. The coal permittee may also make similar use of these ratios.

- B. The use of 0.8 as a cutoff between a Thin and AOC overburden designation, although it has no binding, legal implications, is probably reasonable. The reason for this is solely conceptual, but if a mine has less than 80% of the premine material available for PMT construction, the quantity of material available to reconstruct many of the premine features is minimal.
- C. The use of 1.2 as a cutoff between AOC and Thick overburden designations is much more difficult. The critical issue between an AOC and Thick overburden designation is whether or not *excess* overburden exists. In order to have a condition where excess spoil exists, the permittee must demonstrate that by returning all material to the mined out pit an unstable topography would be created (e.g., a static safety factor less than 1.3). A thick overburden designation does not exist just because AOC has been achieved. AOC may be achieved at a ratio of 0.81 but this does not mean all additional overburden may then be left out of the pit because you can still achieve AOC at a ratio of 1.2. The Federal Judge threw out the numbers but did not throw out the concept.

IV. Overburden Classification and PMT Requirements

A. Approximate Original Contour

1. The Reclamation Plan and associated maps, exhibits, cross sections, etc., should demonstrate that all available spoil has been backfilled and graded to achieve a postmine surface configuration which closely resembles the premine. In order to achieve AOC, some spoil may be placed outside the pit to blend the mined-out lands to the surrounding native topography. However, before any spoil can be used for blending purposes, the applicant must first demonstrate that the reclaimed area topography, within the confines of the pit, meets the intent of AOC. Spoil placed outside the pit to be used for blending purposes is not considered to be excess spoil under the Coal R&R. Placement of spoil material outside the pit for blending purposes does not include blending out-of-pit spoil stockpiles in place. The Reclamation Plan must illustrate that the placement of this spoil creates a stable topography which blends with all reclamation features and native areas.
2. The Reclamation Plan must demonstrate that the reclaimed drainage basin orientation and pattern approximate the premine environment. Creating drainages by incomplete filling of the final void left against the highwall is not appropriate

under an AOC designation. The postmine slope distribution should also approximate the premine slope distribution with the average premine and postmine slope being nearly identical. However, none of the postmine slopes should exceed the angle of repose for the spoil and topsoil material.

3. The Reclamation Plan may not include construction of postmine closed basins unless they are specific replacement features. For further guidance on the subject of Closed Basins, see LQD Guideline No. 17. The Reclamation Plan may include small, shallow depressions to retain moisture, minimize erosion, create and enhance wildlife habitat and enhance vegetation diversity. These depressions should not be evident on the PMT contour map and are classified as "micro-relief". The creation of micro-relief in the PMT should be completely discussed in the Reclamation Plan.
4. Permittees may include the use of terraces if other contouring and construction practices will not ensure the desired slope configuration and surface stability. Justification for incorporating these features into the PMT must be supplied in the Reclamation Plan. All highwalls must be eliminated unless the provisions of Coal R&R Chapter 5 or 7 are applicable.

B. Thin Overburden

1. The Thin overburden designation is warranted when the permittee demonstrates that there is not enough material available to obtain AOC. If the permittee must borrow material from an area undisturbed by mining activity to construct the proposed postmine topography, the necessity of this action can be used to support a thin overburden designation. The Reclamation Plan must demonstrate that all available spoil was returned to the pit and graded to the lowest practical grade allowing for through drainage. Postmine topography elevations cannot exceed premine topography elevations. The quantity of spoil material available may not allow for approximation of the premine drainage pattern. However, the postmine drainage patterns (e.g., drainage basins and channels) must clearly meld with the remnants of the native drainage patterns in an erosionally stable manner. The Reclamation Plan must demonstrate that the postmine drainage channels and their transition to native channels are erosionally stable.
2. Depressions are allowed only if they are shown to be a premine replacement feature or if the feature falls into the "micro-topography" classification where it can be considered to reduce erosion potential, enhance wildlife habitat or aid in revegetation. Generally, the volume of the small depressions associated with

“micro-topography” should be less than 0.5 ac-ft. If an unwanted situation is predicted to exist in the postmine landscape, such as a large swamp (created by resaturation of the spoil aquifer), this does not warrant an automatic justification for a large depression. The operator must first demonstrate that all reasonable remediation efforts have been utilized (e.g., borrow material from adjacent native lands) before large depressions will be considered.

3. The Reclamation Plan must demonstrate that all out-of-pit spoil stockpiles are returned to the pit and the opportunity for leaving in-pit spoil stockpiles is limited. Highwalls should be reduced and blended with the backfill to ensure stable surfaces and slope configurations across the transition from reclaimed to native topography. Once the above condition is satisfied, the Reclamation Plan may then sequentially demonstrate that "residual" overburden is available to create other topographic diversity, such as hills and ridge lines, within the mined out area.

C. Thick Overburden

1. Thick overburden designation allows permittees to leave out-of-pit spoil stockpiles. However, the Reclamation Plan must demonstrate that an adequate quantity of spoil has been returned to the pit to restore AOC (e.g., at a minimum, the volume replacement ratio is greater than one) before a Thick declaration is acceptable. All areas within the confines of the pit should be at or above premine elevations under a thick overburden designation. In addition, review of Federal regulations indicates that Congress was well aware of swell factors and preferred to have higher postmine elevations rather than creating out-of-pit spoil stockpiles, provided that a stable topography can be constructed. Therefore, it may be inferred that in order to leave out-of pit spoil stockpiles, the operator must demonstrate that by placing all spoil material inside the pit, an unstable condition would be created (e.g., a static safety factor of less than 1.3). Spoil that is placed outside the pit is referred to as "excess spoil" according to the Coal R&R.
2. All topsoil and organic matter must be removed in the areas where excess spoil is placed. Excess spoil stockpiles must be graded to maintain a minimum long-term static safety factor of 1.5 and the operator must demonstrate that the configuration of the stockpile is commensurate with the designated postmine land use. The Administrator may limit the horizontal lifts to four (4) feet or less, as necessary, to ensure stability of the fill.
3. The Reclamation Plan must demonstrate that the reclaimed topography will result in stable blending with native topography. The PMT map must illustrate the

location of the *excess* spoil. Because the permittee must obtain an AOC condition within the limits of the pit, premine drainage basin orientation and pattern must be maintained. The postmine slope distribution should also mimic the premine distribution.

4. Depressions are not acceptable under this overburden classification unless they are shown to replace a premine feature or are small enough where they are considered to fall under the "micro-topography" category. Micro-topographic features should not be visible when reviewing the PMT map, but rather incorporated as general language (e.g., micro-relief/topography) in the Reclamation Plan. All of the above is addressed in the Coal R&R, Chapter 4, Section 2(b)(iv) and (ix).